

106.01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS

In approving the quality of material to be supplied, all material will be new, unless otherwise provided in the special provisions.

The Contractor may request the substitution of equal or better materials. Proof that the material is equal or better must be furnished to the Resident/Regional Engineer by the Contractor. No additional cost is allowed for substitution of materials.

106.02 MATERIALS ORDER APPROVAL

The Resident/Regional Engineer will document in writing all approvals of materials to be purchased as listed in Subsection 106.02 of the ITD Specifications. This includes the initial list of materials and any supplemental lists required. Prior to giving approval, the materials list must be reviewed to verify that quantities are acceptable to mitigate delays because of insufficient material and to prevent excess material on hand.

106.03 SAMPLES, TESTS, CITED SPECIFICATIONS

Region and Residency personnel should be familiar with current test methods and Minimum Testing Requirements, and they should be discussed at the preconstruction meeting. When a test method is revised during the course of a project, the latest version must be used. Revised test methods that significantly impact the contractor should be evaluated and may require a change order.

All materials sampling, testing, and the receipt of required manufacturer's certification of construction materials must be completed in a timely and accurate manner as the project progresses. Tests must be performed or obtained as defined in the contract which includes by reference the ITD Quality Assurance Program in the ITD Quality Assurance Manual. Independent Assurance testing is also a required part of the ITD Quality Assurance Program and must be performed as defined by the Independent Assurance Program in the ITD Quality Assurance Manual. When testing is based on a quantity frequency, ensure that testing is distributed throughout to represent the total material quantity. Withhold payment to the Contractor for any material where the required acceptance sampling, testing, and/or certification have not been accomplished.

It is very important that minimum testing requirements (MTRs) for **all** project materials are achieved. Acceptance, verification and independent assurance testing is used as evidence that the project materials were in conformity with the contract requirements and is reported in the Material Summary Report (see below). Any exceptions must be included in the Materials Certification letter. The following actions are required by **both field and office personnel** throughout the project to assure the minimum testing frequencies as specified in the Quality Assurance Special Provision and the Department's Quality Assurance Manual are accomplished:

- 1) Verify as soon as test results are received that testing frequency is meeting minimum testing requirements and that test results are passing including any retests.
- 2) Review material quantities being produced as often as necessary to ensure that independent assurance minimum testing frequencies are met and any issues are resolved.

- 3) Under no circumstances, allow material to be covered over until it has been verified that **all** minimum testing frequencies were met and that test results are passing including any retests.

Notify both the Contractor and the headquarters Construction Section **immediately** whenever minimum testing requirements are not met. The Engineer must coordinate with both the headquarters Materials Section and the Construction Section to determine the proper course of action.

Material Summary Report

The ITD Quality Assurance Manual requires that a summarization of sampling, testing, and certifications for each contract will be assembled by the Engineer into a "Materials Summary Report." The Materials Summary Report, the Independent Assurance Log, and the Materials Certification letter signed by the District Engineer must be submitted to the headquarters Materials Section for every construction project under ITD contract within sixty (60) days from the District Engineer's final acceptance of the project. Each District implements procedures to accomplish these requirements.

The Construction and Materials Sections monitor the Districts' progress on a quarterly basis and provide the Chief Engineer with reports regarding the following:

1. Payment for out of specification material.
2. Payment for material that was not sampled, tested, or certified as required by the specifications.
3. Failure to perform, or a lack of, Independent Assurance testing.
4. Failure to submit the Materials Summary Report and the Materials Certification letter to the headquarters Materials Section within sixty (60) days from the District Engineer's final acceptance of the project.

The headquarters Materials Section reviews each submitted Materials Summary Report and the Materials Certification letter for completeness and accuracy. The District is then notified if any additions or corrections are needed and the District will provide the needed information as soon as possible.

The headquarters Materials Section will forward the final Materials Summary Report and the Materials Certification letter to FHWA (when required), Financial Services, and the Construction Section within sixty (60) days after the original submittal of the report and letter by the District.

Sampler, Tester and Laboratory Qualifications

When applicable, both Contractor and State personnel must have current WAQTC qualifications for materials testing including sampling. **All** testing facilities used must also be qualified as required by the Department's laboratory qualification program. Both the Engineer and the inspection staff have responsibility to monitor compliance. The Engineer will include personnel and laboratory qualifications as a preconstruction meeting topic and confirm personnel and laboratory qualifications prior to start of construction activities.

Require from the Contractor a listing (and certifications for the file) of all personnel who will be performing material sampling and testing. Verify current qualifications using the Department's internet website and place the listing and verification documentation in the project file for **both** State and Contractor personnel.

For testing facilities, verify that the laboratory's qualification is current, and that the laboratory logbook is being maintained. The logbook must contain equipment calibration data for the test methods to be used on the project and independent assurance documentation.

Inspection staff must verify personnel and laboratory qualifications throughout the project. Verify using the above procedure and place in the project file for any new personnel or testing facilities. Also, periodically spot-check all personnel and laboratory qualifications to verify that they are still current and document for the project file as well.

The Engineer will verify that all personnel and laboratories are currently qualified and documented in the project file.

Random Sampling Schedules and Times

When applicable, test samples are obtained using stratified random sampling. Stratified means that the sampling is based on the given minimum testing requirement frequencies and a separate random number must be obtained for each testing frequency quantity. The purpose is to avoid introducing sampler bias in selecting when and where (if applicable) to obtain material samples for testing. For samples obtained on the roadway, the random number can be the same for both material quantity and roadway location. Random location determination includes both length and width. See any WAQTC course book under the section *Random Sampling of Construction Material* for the procedure in determining sample locations randomly.

A random sampling system can be any of the following:

- A random number generator on a hand-held calculator.
- A random number table (contained in any of the Department's sampler and tester qualification course books).

It is acceptable to generate the random numbers for the entire project at project start.

Quality Assurance Special Provision

The Quality Assurance (QA) Special Provisions modify Subsection 106.03 requirements regarding materials testing and acceptance. Under the QA Special Provisions both Contractor and State perform materials testing, and acceptance is based in part on State material quality analysis using statistical methods. The State still retains the right to test materials at any time and to require the removal of defective material.

The QA Special Provisions should also be a subject at the preconstruction and preoperational conferences. Additional topics to address include:

- 1) Verification of contractor meeting minimum testing requirements.

- 2) Completing and presenting acceptance and verification test results by the next calendar day. Also discuss methods of data transfer.
- 3) Re-testing criteria requirements (“check” test).
- 4) Providing the Contractor with random sampling schedules and times.
- 5) Verification evaluation – failing t-test procedures.
- 6) Independent assurance of contractor acceptance testing
- 7) Dispute Resolution
- 8) 0.75 and 0.85 pay factor decision criteria.
- 9) Defective material.
- 10) Any changes from previous specification versions.

Quality Control and Acceptance Testing

Both the State and Contractor must complete and present acceptance test results no later than the next day. Enforcement of this requirement is very important. Process adjustments and administration decisions are made based on test results. Failure to provide test results could result in more rejectable or inferior material being placed than if the results had been received as required. Do **not** allow work to proceed if the contractor is not completing and presenting test results by the next calendar day.

Table 106.03-1 of the QA Special Provision shows the material quality characteristics that must be tested for each bid item including the test method, the minimum testing frequency and test location. The table also identifies who (Contractor or State) is responsible for the quality characteristic testing.

Verify that all test results are recorded on Department forms. Do not accept test results as final if the forms are not completed properly including:

- WAQTC qualification numbers recorded for both sampler and tester.
- Tests are correctly numbered and identified either as quality control or acceptance. Acceptance tests must be numbered sequentially.
- Form header information correctly filled out including project number, bid item and quantity of material the test represents.
- For test results showing material did not meet specifications, the forms document:.....*“the nature, number, and type of deficiencies found; the quantities approved and rejected; and the nature of corrective action taken, as appropriate.”*

In addition to quality control and acceptance testing, the contractor is also required to keep at least run charts for each quality characteristic that is to be used in statistical analysis. Run charts are plots of the test result data in sequence and are an aid in identifying material trends (both better and worse). Verify and require that the Contractor is maintaining these run charts.

Together, the test results and the run charts are an initial indication of material quality. Review test results (across at least three consecutive tests) and run charts for material that is:

- Not within specification upper and lower limits – Discuss with contractor whether production adjustments are needed.
- Not consistently trending within upper and lower specification limits or wide variability in the test result data points – Discuss with the Contractor regarding what is being done to rectify problems with production consistency.
- Trending close to either the upper and lower specification limits – Discuss with the Contractor whether production adjustments must be made and, if not, then advise that there may be a detrimental impact on pay factors resulting in rejectable material and payment deductions.
- Trending upwards or downwards across test results - Discuss with the Contractor regarding what is being done to rectify problems with production consistency.
- Document all above discussions with the Contractor.

It is very important that each acceptance test result be reviewed as soon as it is received for the quality characteristics listed below. These characteristics are subject to retesting criteria requirements (check test):

- Fracture
- Sand Equivalent
- Cleanness Value
- 100 percent passing
- 97-100 percent passing
- 95-100 percent passing

Verify and ensure that the Contractor is following the specification requirements for all tests that show results that are outside the specification limits:

- Contractor immediately obtained another sample and retested for the failing quality characteristic – If the “check” test was not obtained, discuss with the Contractor the reasons why and inform the Contractor production will be stopped if non-compliance continues. An acceptable reason is that the time to complete the test method exceeded when the next random sample was obtained. In this case the random sample also serves as the “check” test.
- If the “check” test failed, Contractor suspended production and made adjustments to the process.
 - If not, discuss with the Contractor the reasons why and inform the Contractor production will be stopped if non-compliance continues.
 - If so, the adjustments must be documented on the “check” test form (i.e. corrective actions taken).

Samples are retained as required by the Special Provision for all acceptance gradation and asphalt binder content testing. See the Special Provision for requirements. These samples are to be used **only** in third party dispute resolution. Dispute resolution is further discussed below.

All test samples must be obtained randomly (see above Random Sampling and Times section). Within each testing frequency quantity, a separate random number must be obtained for each quality characteristic. The Contractor is responsible for generating random sample schedules

and times for quality control testing. In accordance with the QA Special Provisions (sheet 3), **for all acceptance testing....."sampling schedules and times will be determined by the Engineer using a random sampling system."** This includes the Contractor's acceptance testing as well as the State's acceptance and verification testing. Document the random numbers in the construction diary including when the numbers were given to the contractor.

Do **not** inform the Contractor of the random number until it is time for the sample to be obtained. However, the Contractor should be informed of the random number sufficiently in advance (i.e. sufficiently in advance) before the acceptance test sample is to be obtained so that qualified personnel are on hand. It is still the Contractor's responsibility to ensure that there are qualified personnel available to obtain the sample when the random number is reached. Stop production if the Contractor's personnel are not available to obtain the sample. Under no circumstances should the State obtain the sample for the Contractor.

Verification Testing

23 CFR 637.207 requires the State to validate the Contractor's acceptance testing by verification testing. The State must submit the verification test results to the Contractor no later than the next calendar day. Table 106.03-1 point of sampling and test methods for acceptance testing are to be used for verification testing. Verification samples are obtained by random sampling as well so random numbers must also be generated.

Sampling frequency is two samples per lot (see the quality analysis section for lot discussion) and **no more** than two per day. It is not required to take more than two verification samples a day.

Verification evaluation of the Contractor's acceptance test results follows once the test results are obtained. The verification evaluation is on an ongoing cumulative basis. Succeeding test results as they are received are added to **all** the previous test results and then reevaluated.

The evaluation is performed using Departmental computer programs. The program will indicate whether the "t-test" passes or fails. It is very important that the verification evaluation be performed if at all possible on a daily basis as production may be affected by the outcome.

If the "t-test" shows passing, the acceptance test results can be grouped into lots for quality analysis. If the "t-test" fails, immediately do the following:

- 1) Check that data entry is correct.
- 2) Plot the acceptance test results and the verification test results separately to determine if the differences can be attributed to sampler and testing variation – if the two data plots look very similar, the t-test failure is probably an erroneous result (e.g. false failure). False failures are also very likely to occur at the beginning of the project simply because sample sizes are so small.
- 3) Verify that the Contractor has turned in all acceptance test results and that all verification test results are being used.

- 4) If the differences are not attributed to items 1 through 3, **stop production** and assess test procedures including methods and equipment, calculations and any other information to ensure that methods are correct and equipment is calibrated and working properly. Get independent assurance involved if necessary.
- 5) If differences still cannot be resolved, consider third party dispute resolution using the retained split samples.
- 6) Discuss with the Contractor potential contract time adjustments.

Independent Assurance

As with quality control and acceptance testing, independent assurance (IA) is also based on given frequencies of material quantities although at greater intervals (typically one IA test for every 20 acceptance and verification tests). Independent assurance must be scheduled among all projects in the District. Refer to the Departments Quality Assurance manual for testing frequencies. Keep track of quantities and production rates so that District Materials can be notified sufficiently in advance to prevent missing independent assurance minimum frequencies because of conflicting project schedules.

Dispute Resolution

Dispute resolution is valid only if there are **significant** discrepancies between the Contractor's and State's testing. The Engineer evaluates on a case-by-case basis whether the evidence shows the discrepancies are significant. Dispute resolution applies to the quality characteristics identified in Table 106.03-1 as well all acceptance test strip testing. Dispute resolution is a three part process: 1) Initiation; 2) Process; and 3) Third party.

The Contractor must provide written notice with supporting documentation within 3 days of receiving the disputed test results or the process is waived. However, **be aware** of constructive notice. Constructive notice means that if we know that the Contractor thinks that something is wrong with the test results (e.g. they are verbally complaining about the test results after receiving them), they are essentially verbally notifying us that they are disputing the results.

It is difficult to enforce the three-day written notice time limit if we are aware there is a problem (e.g. the Contractor has verbally complained). To avoid constructive notice, ask the Contractor if they are disputing the results. If:

- 1) Yes. Write an AVO to the Contractor reminding them that they have three days to provide written notice with supporting documentation or the process is waived.
- 2) No. Write an AVO to the Contractor stating that it is understood that they are not disputing the test results.

Remember that the disputed differences must be significant and the Contractor is responsible for providing the evidence. Causes for rejecting dispute resolution procedures include but are not limited to:

- 1) The Contractor simply does not like the test results without any supporting evidence.
- 2) The Contractor's personnel or laboratories were not qualified.

If the differences are considered significant, the Contractor and State then work together to determine the differences. The same techniques are used as when the verification evaluation t-equation indicates failing (see above discussion under verification evaluation). Split samples are **not** to be used at this stage of the process.

Finally, if the Contractor and State still cannot resolve differences, third party resolution is used based on a mutually agreed upon work plan. The work plan could include the third party evaluating what the source of the differences are; and/or testing the retained split samples (see above discussion under the quality control and acceptance sampling section).

Third party results are final which means their results are used and **not** the State's or the Contractor's. See the specification for cost and time adjustment criteria.

Quality Analysis

Quality analysis applies to both Contractor and State acceptance test results.

Quality analysis begins after the:

- 1) Acceptance test results are completed and submitted by the Contractor, or completed by the State;
- 2) Verification evaluation has been performed when the Contractor performs the acceptance testing and, if applicable:
- 3) A verification evaluation failing t-test has been satisfactorily resolved (i.e. the source of differences were resolved).

Quality analysis is used to establish the pay factor which is determined by the material quality level. Quality level is based on what percent of material is likely to be within specification upper and lower limits and how consistent material production (i.e. low variability in test results) is. Statistical methods are used and, as with verification evaluation, Departmental computer programs do the necessary calculations and are to be used. Contact the Construction Section for additional information.

Quality level analysis is **not** performed if the total project quantity has an overall given testing frequency of two tests or less. However, testing **still is** required by the State. **Be aware** of quantity underruns and overruns either caused by quantity variations or change orders. Ensure that samples are still obtained at the given testing frequencies shown in Table 106.03-1 based on **actual** project quantities. Material acceptance is based on passing test results when quality level analysis is not performed.

Unlike verification evaluation which is cumulative, acceptance test results are grouped into lots for quality analysis. The specifications define the criteria for grouping test results into lots. There are two methods that are applicable and depend on which QASP is in use for the project:

- 1) Method 1 (QASPs dated July 2003 or earlier) –Lot size is based on 3 to 7 acceptance tests.
- 2) Method 2 (QASPs dated after July 2003) – Lot size is base on number of acceptance tests obtained during a work shift.

For both methods, minimum lot size is three acceptance tests. To illustrate the criteria used for each method:

Method 1

Day	No. of Tests	Tests in Lots	Comments
1	2	0	Criteria 2: tests are grouped with the following day.
2	4	6	Criteria 1: lot size varies between 3 and 7 tests.
3	9	5&4	Criteria 5: first group tests in lots of 5.
4	3	3	Criteria 1 and 4: there are enough tests for a lot.
5	1	0	Criteria 2: tests are grouped with the following day.
6	8	4&5 (1 test from day 5 and 3 from day 6; 5 tests from day 6)	Criteria 5: first group a day's production in lots of 5.
7	2	0	Criteria 2: tests are grouped with the following day.
8	5	5&4 (5 from day 8; 4 includes days 7 & 9)	Criteria 5: first group a day's production in lots of 5.
9	2	0	Criteria 3: tests are grouped with the previous day.

Method 2

Work Shift	No. of Tests	Tests in Lots	Comments
1	2	0	Criteria 3: tests are grouped with the following work shift.
2	4	6	Criteria 1 and 3: Work shift 1 and 2 are combined.
3	9	9	Criteria 1: first group tests in lots of 5.
4	3	3	Criteria 2: there are the minimum tests needed for a lot.
5	1	0	Criteria 3: tests are grouped with the following day.

6	8	9	Criteria 1 and 3: work shift 5 and 6 are combined
7	2	0	Criteria 2: tests are grouped with the following day.
8	5	9	Criteria 1, 3 and 4: Work shifts 7,8 and 9 are combined.
9	2	0	Criteria 3: tests are grouped with the previous day.

It is very important upper and lower specification limits are correct in the statistical analysis since production decisions and payment are based on the calculated resultant pay factors. Also, remember that not all quality characteristics are subject to statistical analysis. Quality characteristics subject to statistical analysis are shown in the table below. Also refer to the latest version of the specification to determine whether other bid items have been added.

Quality Characteristic	Bid Item
Aggregate Gradation	301, 303, 307, 403, 404, 405, 412, 635
Density	405
Asphalt Content	405, 412

For aggregates other than plant mix, the upper and lower specification limits are defined by the gradation tolerances as specified in the applicable sections of Section 703 aggregates. Always verify whether these tolerances were modified by the Special Provisions. An **exception** is for Section 403 and 404 materials. Use 3 percent as the upper specification limit for statistical analysis **only** if the gradation tolerances are 0 to 2 percent passing.

For plantmix aggregates the upper and lower specifications are determined as follows:

- 1) Determine the single percent passing gradation from the job-mix formula
- 2) Calculate the upper and lower specification limits using the tolerances defined in Subsection 405.03 F Mixing.
- 3) Check to see whether the above calculated tolerances are within the maximum and minimum control points specified in the tables in Subsection 703.05. If:
 - a. Yes. Use the limits as calculated in item 2 above.
 - b. No. Use the control point limits as defined in Subsection 703.05.

For example: The 25 mm sieve target gradation is 92. The 405.03 F tolerance is plus or minus 7. The control point maximum and minimum is 90 to 100. Per Subsection 405.03 F the calculated gradation range is 85 to 99. However, per Subsection 703.05 the lower specification limit is 90 instead of 85 because the bottom control point range was exceeded. The upper specification limit remains at 99 because it is within the control point range.

- 4) Only the sieves that are marked with an asterisk (*) in the Subsection 703.05 tables are used in quality analysis.

See Section 405 and the QC/QA Special Provisions for asphalt binder content and density upper and lower specification limits.

Pay Factor Decision Criteria

As with verification evaluation, it is very important that pay factors be calculated after test results are received. Production decisions are made based on the pay factor quality analysis results. See the specifications for decision criteria.

106.04 CERTIFICATION OF MATERIALS

Certain materials and fabricated items or small quantities of miscellaneous non-critical materials may be accepted based on certification by the manufacturer that the material furnished complies with specifications. The Minimum Testing Requirements (MTRs) Section 8.25 and Field Test Manual Part II, Section 8.12 and 8.13 indicate items that may be accepted by certification. Standard Specifications, Plans, and Special Provisions may also indicate certification requirements. Certification for materials other than those provided shall be approved by the Materials Engineer for acceptability.

Buy America

For all federal-aid projects only, all steel materials and products that contain significant quantities of steel must be certified that the steel was manufactured in the United States of America. Such certification shall be provided prior to incorporation of these materials into the project. Materials that are only used or rented during the project construction, but not incorporated into the work, do not require certification.

Larger quantities of steel that will be incorporated into the project should be certified by the manufacturer; i.e., the mill that produced or rolled and fabricated structural steel shapes. Smaller quantities of steel where the product is incorporated into a manufactured item such as right of way markers may be certified by the fabricator of the finished product.

Buy American Certifications shall conform to the following type of wording:

The reinforcing steel materials incorporated into the reinforced concrete pipe culvert furnished to Idaho Federal-Aid Project (project number) by (Name of Supply Company) have been produced in the United States and all manufacturing processes for these materials including the application of coatings have occurred in the United States.

(Signature)

Name

Company Title

The certification must be signed by a person having quality control responsibility for the company that manufactures, fabricates, or supplies the material.

Small quantities of steel may be accepted without Buy American Certification, so long as its total value for the project does not exceed 0.1% of the contract amount or \$2,500, whichever is greater. The cost shall include the engineering and fabrication costs necessary to make the steel fit the finished product.